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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/665,133

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EXAMINER

YU, JAE UN

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/665,133	Applicant(s) OOTA, MASAO	
	Examiner JAE U. YU	Art Unit 2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,7 and 9-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,7 and 9-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/28/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The examiner acknowledges the applicant's submission of an amendment dated 3/13/2008. At this point claims 1, 7, 9, 10, 21-23 have been amended. Claims 6 and 8 have been cancelled. Thus, claims 1-5, 7 and 9-24 are pending in the instant application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 3-5, 7, 9-18 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boivie et al. (US 2003/0235155) in view of Fujibayashi (US 2003/0131278) and Baxter, III (US 6,865,643), referred to as "Baxter" herein after.
2. As per independent claims 1, 21 and 24, Boivie et al. disclose, "a computer-readable medium storing a program [**a programmed product stored in a media executable by a digital data processor incorporating a CPU, Paragraph 50**] used to direct a computer to control processes of dividing redundant data into a plurality of volumes [**dividing data into a plurality of packets for transmission, Abstract**] in a system comprising storage units scattered through a network [**nodes scattered**

through a network, Figure 1], and distributing and storing volumes in a plurality of storage units **[routing data packets among the nodes, Paragraph 42]**”,

“Computing an evaluation value indicating desirability of each of the scattered storage units to be used **[A routing destination is determined from the “combination of parameters” (Paragraph 42).]** based on a route evaluation table storing information about each section in a globally distributed storage system, the section information including an identification code **[node identifications, Figure 1]**, a bandwidth **[network bandwidth, Paragraph 42]**, a communications cost **[noise of the intercommunication links, Paragraph 42]**, and a physical distance **[distance between the transmitting node and a receiving node, Paragraph 42]**; and selecting a plurality of storage units as an optimum storage set **[selecting an optimum path for data transmission comprising a plurality of nodes, Paragraph 42]** from among the scattered storage units based on the evaluation value”.

Boivie et al. do not disclose expressly, “the evaluation value increases as the physical value increases while there is no substantial change in the bandwidth and the communication cost”.

Fujibayashi discloses a desirability to store a backup data in a remote site instead of storing it locally in paragraphs 2 and 3.

Boivie et al. and Fujibayashi are analogous art because they are from the same filed of endeavor of controlling a plurality of storage devices in different locations.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify Boivie et al. by storing a backup data in a remote site instead of storing it locally as taught by Fujibayashi in paragraphs 2 and 3.

The motivation for doing so would have been to “enable a customer to survive a disaster that could destroy data stored at the primary site” as expressly taught by Fujibayashi in paragraphs 1 and 2.

Therefore, it would have been obvious to combine Fujibayashi with Boivie et al. for the benefit of increased data integrity to obtain the invention as specified in claims 1, 21 and 24.

Boivie et al. and Fujibayashi do not disclose expressly that the not selected storage unit “stores a replica of a first volume”.

Baxter discloses, “mirroring” in column 1, at lines 35-55.

Boivie et al., Fujibayashi and Baxter are analogous art because they are from the same field of endeavor of data communication.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify Boivie et al. and Fujibayashi by including a RAID system implemented with a mirroring scheme as taught by Baxter in the abstract.

The motivation for doing so would have been to provide parallel read/write operations as expressly taught by Baxter in column 1, at lines 25-35.

Therefore, it would have been obvious to combine Baxter with Boivie et al. and Fujibayashi for the benefit of parallel input/output to obtain the invention as specified in claims 1, 21 and 24.

3. **Independent claims 22 and 23** have the same scope as claim 21, wherein the “route management means” and the “storage set management means” correspond to the “route management” 504 and the “storage set management” 505” in Figure 4 of the specification. Therefore, claims 22 and 23 are rejected by the same reasons as claims 1 and 21.

4. **Claim 3** discloses, “providing the storage unit as a virtual storage unit [“**virtual network**”, **Paragraph 6**] for a user of the system”.

5. As per **claim 4**, **Baxter discloses reading data from RAID volumes based on a priority in the abstract, wherein the “redundant portion” (“parity” for RAID, Column 1, Lines 35-55) is only read when a primary system fails.**

6. As per **claim 5**, Boivie et al. and Fujibayashi disclose, “when the data is read, a use priority indicating high response based on the bandwidth and the cost for each storage unit [indicating the next hop based on the bandwidth and the noise of the

intercommunication links, Paragraph 42]”. Baxter discloses reading data based on a priority in the abstract, wherein the “redundant portion” (“parity” for RAID, Column 1, Lines 35-55) is only read when a primary system fails.

7. **Claim 7** discloses, “when a replica of the first volume is generated, based on the evaluation value selecting a method from between two generating method based on the evaluation value, that is, replicating the first volume from a storage unit storing the first volume [if “**the first volume**” has the best “**distance**”, Paragraph 42, Boivie et al.], and regenerating the first volume using redundancy [generating a replica of the “**first volume**” using the first mirror of the “**first volume**”, Column 1, Lines 35-55, **Baxter**] from volumes other than the first volume in the plurality of volumes [if “**the first mirror**” has the best “**distance**”, Paragraph 42, Boivie et al.]”.

8. **Claim 9** discloses, “writing a volume in a multicast system [“**virtual network**”, Figure 1, Boivie et al.] to a plurality of storage units [“**striping**”, Column 1, Lines 35-55, **Baxter**] storing the same volume”.

9. **Claim 10** discloses, “when a replica of the first volume is written to a storage unit [“**mirroring**”, Column 35-55, **Baxter**], a writing process is performed in plural operations [“**striping**”, Column 1, Lines 35-55, **Baxter**]”.

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10. **Claim 11** discloses, “when a fault occurs in the first storage unit in the storage set, limiting a write to other storage units in the storage set **[Since the data packets are routed in cascaded series of nodes, if a fault occurs in one of the nodes, the transmission to the following nodes is inherently limited, Paragraph 42]**”.

11. **Claim 12** discloses, “when a fault occurs in a third storage unit in the storage set **[A “neighbor” goes down, Paragraph 38]**, selecting based on the evaluation value a fourth storage unit other than a storage unit selected as the storage set instead of the third storage unit **[acquiring new routes through a new neighbor, Paragraph 38]**”.

12. **Claim 13** discloses, “after selecting the storage set, reselecting a storage set in each node at a predetermined timing **[routers adapting to changes in the underlying network topology by periodically determining the changes in distances, Paragraph 32]**; and when there is a volume not used by any node as a result of reselection, deleting the volume from a storage unit **[a router with undesirable distance no longer serves as a data path for the host, Paragraph 32]**”

13. **Claim 14** discloses, “the predetermined timing refers to a predetermined period after previous selection **[“re-ping” periodically, Paragraph 32]** or a timing of changing a state of a volume”.

14. **Claim 15** discloses, “after reading the data, temporarily storing the data **[data packets temporarily reside in a router before transmission, Paragraph 42]** for a predetermined period **[latency within the router]** in an arbitrary storage unit; and when data is read within the predetermined period, reading temporarily stored data from the storage unit **[the data transmission, Paragraph 42]**”.

15. **Claim 16** discloses, “temporarily storing data specified in a write request within a predetermined period **[storing data packets in a node with the next best “distance” when a node with the best “distance” is congested, Paragraph 42 & 32]** in a temporarily storage area; retrieving data from the temporary storage area after the predetermined period **[retrieving the data packets from the node with the “next best distance”, Paragraph 42]**”.

“Dividing the data into a plurality of volumes; and writing the plurality of volumes in the storage set **[dividing data into a plurality of packets for transmission, Abstract]**”

16. **Claim 17** discloses, “when a reading or writing process is performed on data including the temporarily stored data **(See the rejection for claim 15 above)**, reading or writing only a portion of data not containing the temporarily stored data **[data packets routed in a different path than the path containing the “temporary storage”, Figure 1]**”.

17. **Claim 18** discloses, “when the plurality of volumes are written to the storage set, prohibiting a write process on the storage set until a write is completed for a node to which the write request is issued **[looking for other storage set if the current storage set is congested, Paragraph 42]**”.

18. **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over Boivie et al. (US 2003/0235155) in view of Fujibayashi (US 2003/0131278) and Baxter (US 6,865,643) as applied to claims 1 and 21-24 above and further in view of Winter et al. (US 2004/0008691).

19. As per **claim 2**, Boivie et al., Baxter and Fujibayashi disclose, “in computing the evaluation value, a bandwidth, a communications cost, and a physical distance between a node to which a write request is issued and a storage unit **[See the rejection for claim 1 above]**”.

Boivie et al., Baxter and Fujibayashi do not disclose expressly, “a hop count”.

Winter et al. disclose, “a hop count” in paragraph 37.

Boivie et al., Baxter, Fujibayashi and Winter et al. are analogous art because they are from the same field of endeavor of controlling a plurality of storage devices.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify Boivie et al., Baxter and Fujibayashi by determining data routing path based on “a hop count” as taught by Winter et al. in paragraph 37.

The motivation for doing so would have been that a hop-count based routing scheme is advantageous in applications requiring lower latency as expressly taught by Winter et al. in paragraph 37.

Therefore, it would have been obvious to combine Winter et al. with Boivie et al., Baxter and Fujibayashi for the benefit of providing low latency routing scheme to obtain the invention as specified in claim 2.

20. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boivie et al. (US 2003/0235155) in view of Fujibayashi (US 2003/0131278) and Baxter (US 6,865,643) as applied to claims 1 and 21-24 above and further in view of Carteau (US 6,606,694).

21. As per **claim 19**, Boivie et al. Baxter and Fujibayashi disclose, “prohibiting a writing process in the plurality of storage units (See the rejection for claim 18 above)”.

Boivie et al., Baxter and Fujibayashi do not disclose expressly, “determining a storage unit as a representative storage unit from among a plurality of storage units storing the same volumes”.

Carteau discloses mirroring data among a plurality of disks, wherein the “primary” disk corresponds to the “representative storage unit in column 1, at lines 46-58”.

Boivie et al., Baxter, Fujibayashi and Carteau are analogous art because they are from the same field of endeavor of networked storage system.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify Boivie et al., Baxter and Fujibayashi by including the mirroring scheme taught by Carteau in column 1, at lines 46-58.

The motivation for doing so would have been to facilitate copies of different states of a database as expressly taught by Carteau in column 2, at lines 15-20.

Therefore, it would have been obvious to combine Carteau with Boivie et al., Baxter and Fujibayashi for the benefit of keeping up with state changes of a database to obtain the invention as specified in claim 19.

22. **Claim 20** discloses, “the representative storage unit is a storage unit for storing a volume as original data”. Carteau discloses mirroring data among a plurality of disks, wherein the “primary” disk corresponds to the “original storage unit in column 1, at lines 46-58”.

Arguments Concerning Prior Art Rejections

1st Point of Argument

Regarding claims 1 and 21-23, the examiner directs the applicant's attention to the new ground(s) of rejection above.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

A. Claims No Longer in the Application

Claims 6 and 8 are cancelled.

B. Claims Rejected in the Application

Claims 1-5, 7 and 9-24 have received a second action on the merits and are subject of a second action final.

C. Direction of Future Remarks

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jae Un Yu who is normally available from 9:00 A.M. to 5:30 P.M. Monday thru Friday and can be reached at the following telephone number: (571) 272-1133.

If attempts to reach the above noted examiner by telephone are unsuccessful, the Examiner's supervisor, Sanjiv Shah, can be reached at the following telephone number: (571) 272-4098.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jae U Yu/

Examiner, Art Unit 2185

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/Hong Kim/

Primary Examiner, Art Unit 2185